

Ergonomisko palīglīdzekļu piemēri



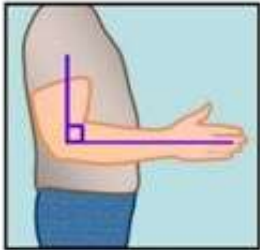
<http://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2011-191.pdf>

Plaukstas ortozes



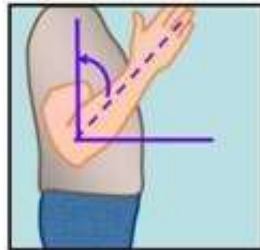
Elkoņa un pleca kustību ergonomika

Neutral Posture

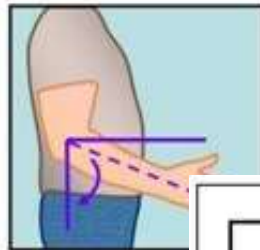


Awkward Postures

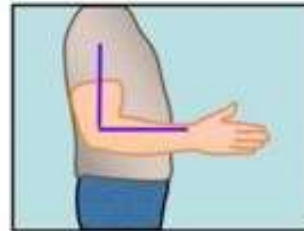
Elbow Flexion



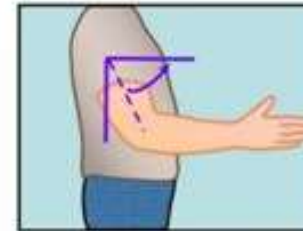
Elbow Extension



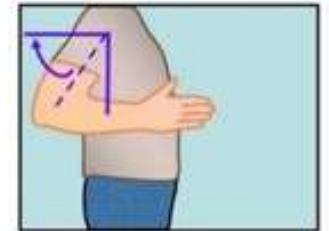
Neutral Posture



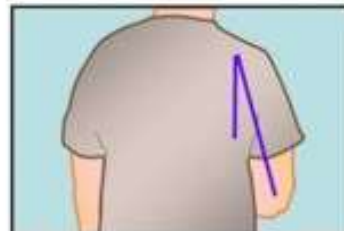
Shoulder Flexion



Shoulder Extension



Shoulder Abduction



Shoulder Abduction & Extension



<http://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2011-191.pdf>

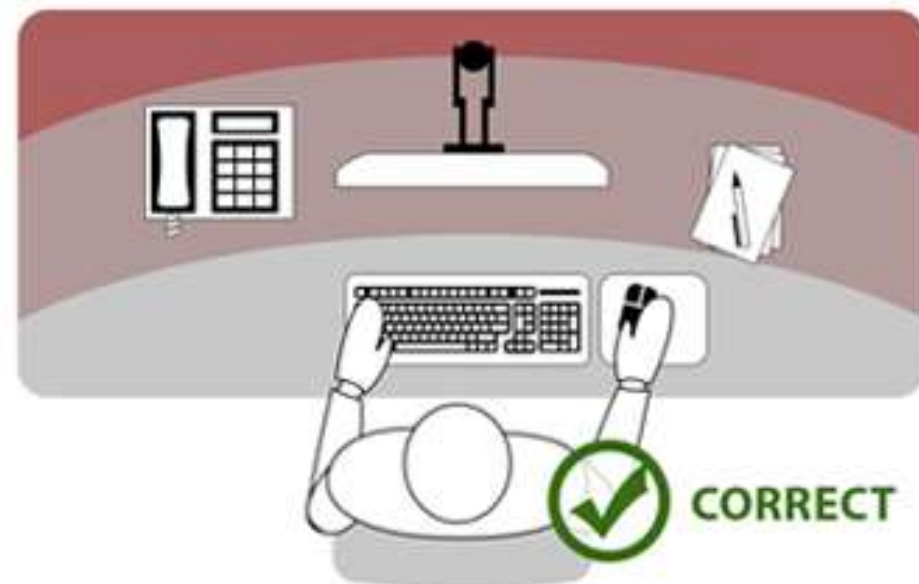
Rokas novietojums, strādājot pie datora



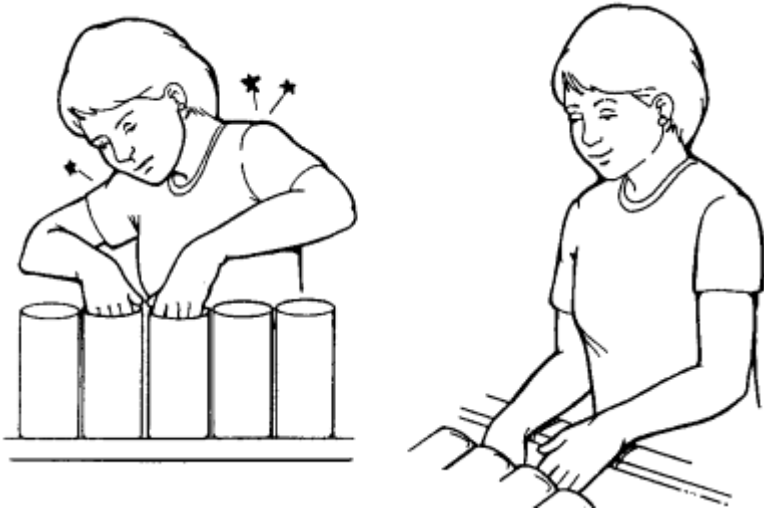
"Rare" Zone
26+ inches (~65+ cm.)

"Occasional" Zone
10-20 inches (~25-50 cm.)

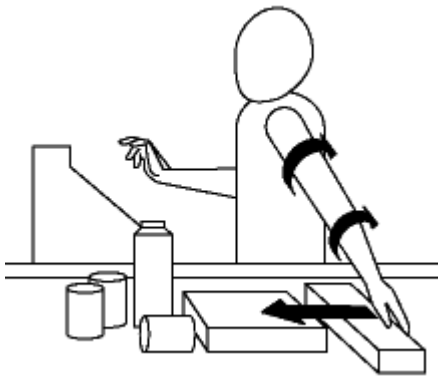
"Usual" Zone
up to 10 inches (~25 cm.)



Plecu kustību ergonomika



<http://www.danmacleod.com/ErgoForYou/Principles%20Images/01%20arms,%20cylinder%20line.gif>



<http://images.ccohs.ca/oshanswers/rmi3c.gif>



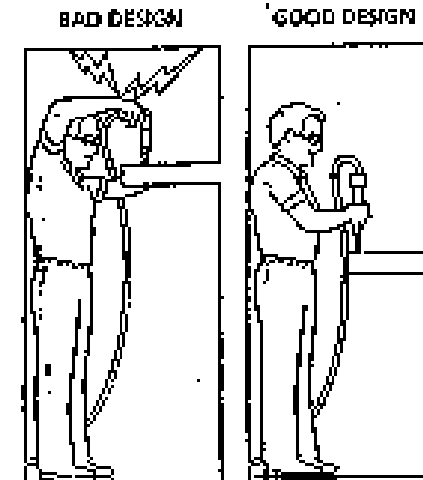
BAD DESIGN



GOOD DESIGN

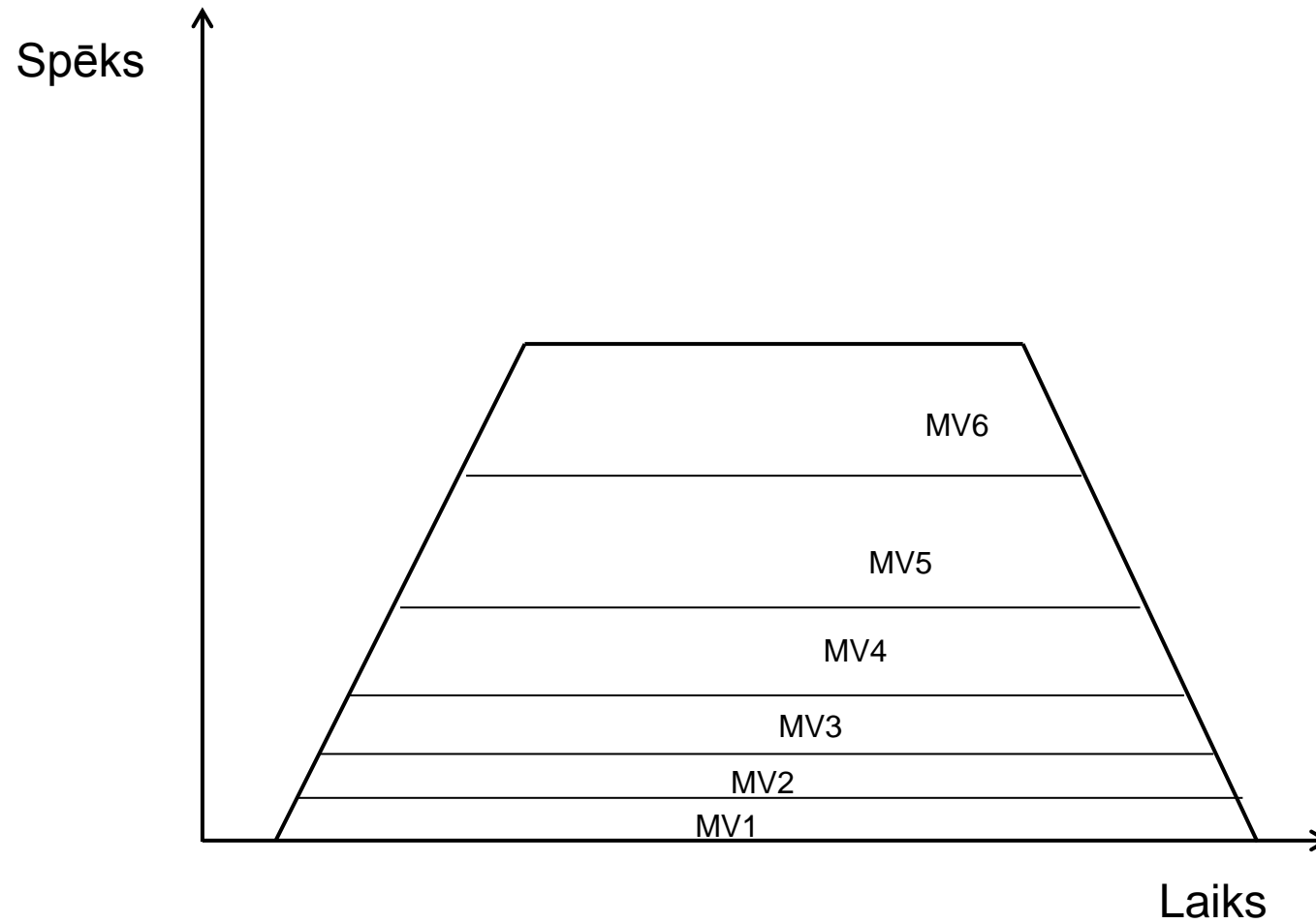


https://www.osha.gov/SLTC/etools/computerworkstations/images/comp_armrest_positions.jpg



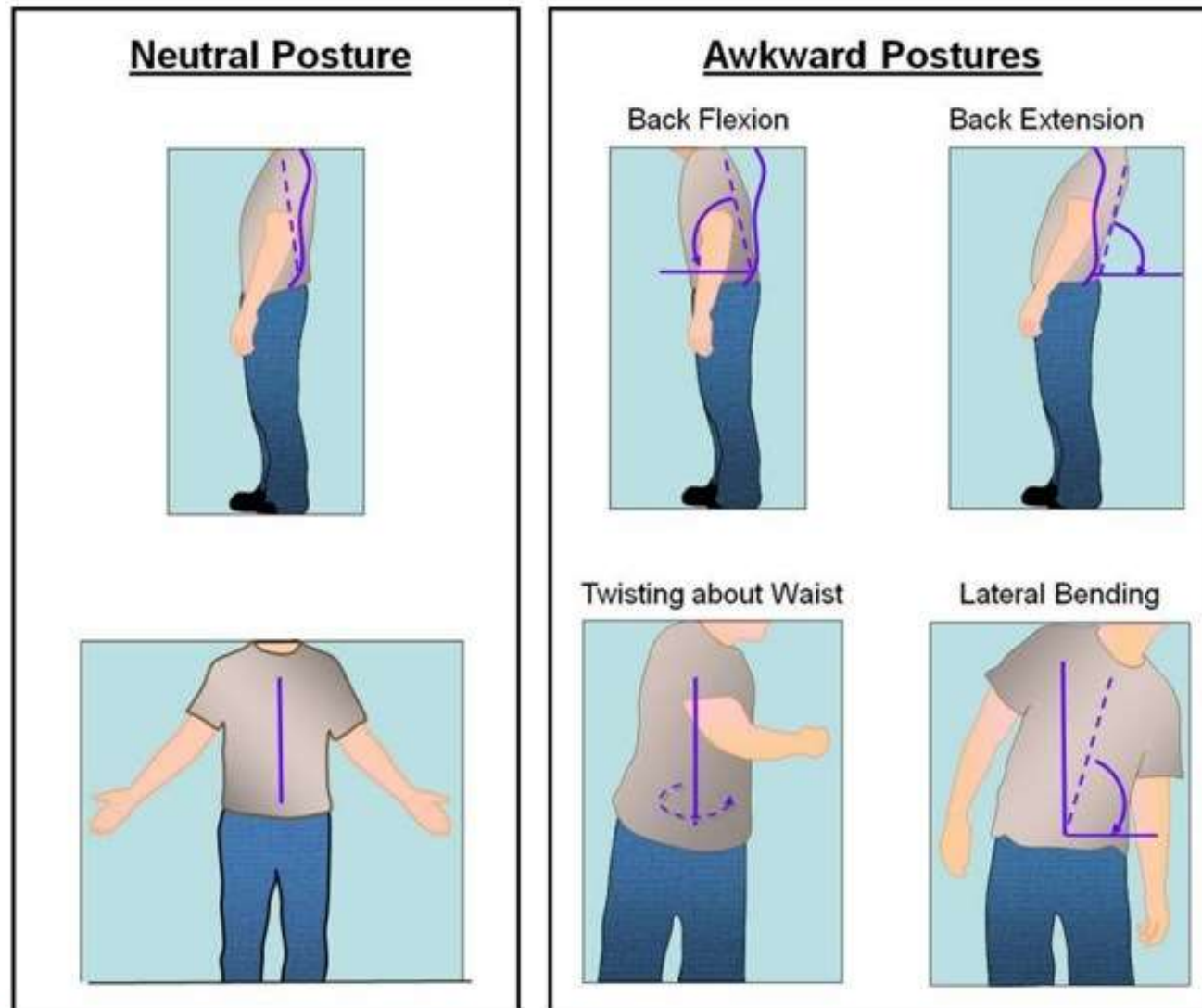
http://www.collectionscanada.gc.ca/eppp-archive/100/200/301/ic/can_digital_collections/caw/ergonom.htm

Pelnrušķītes fenomens



MV – motorā vienība

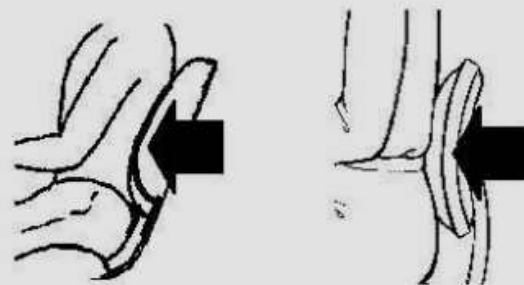
Mugurkaula kustību ergonomika



Mugurkaulam ir svarīgi uzturēt pareizos izliekumus darba laikā

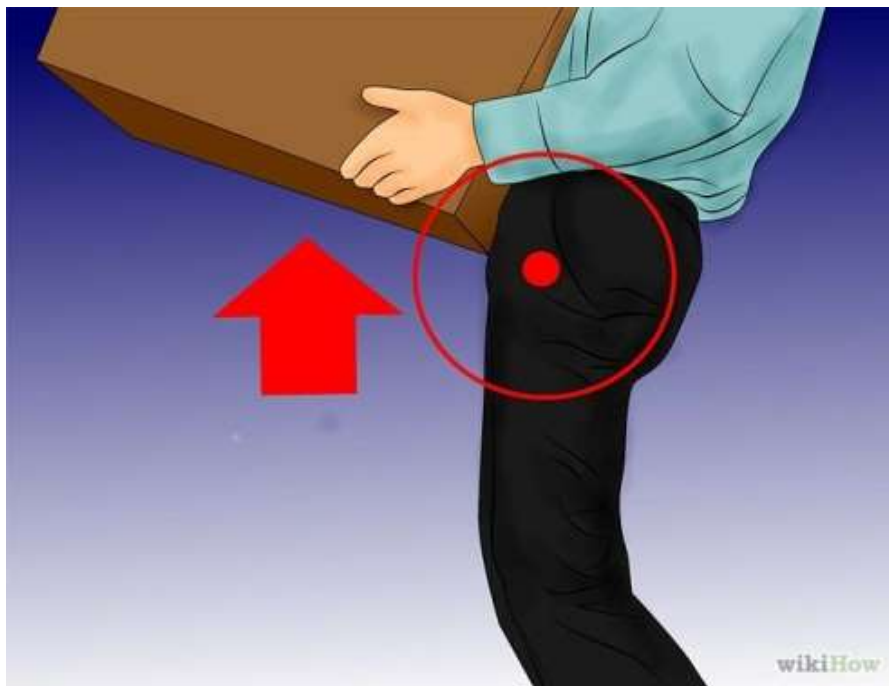


Keep the S-curve, whether sitting or standing.



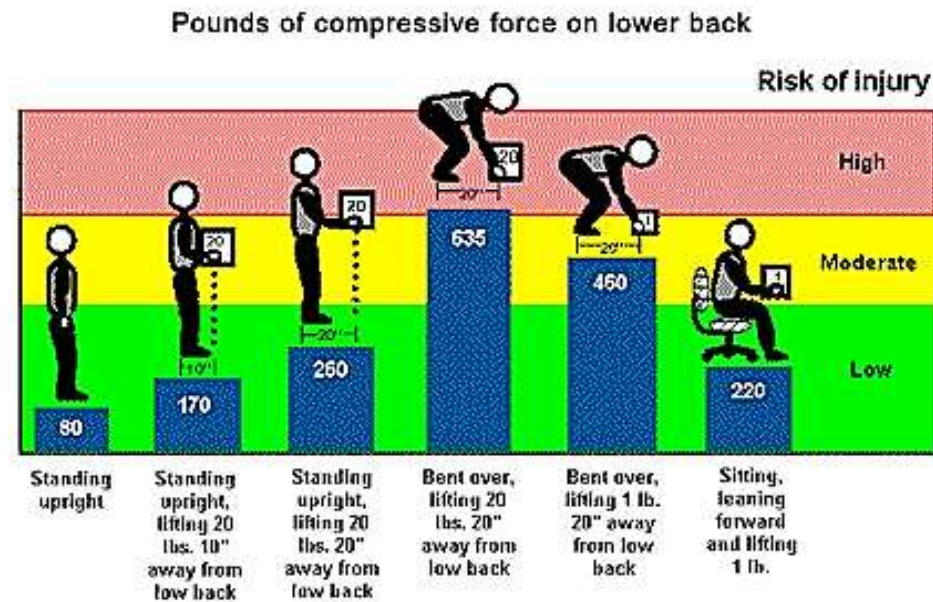
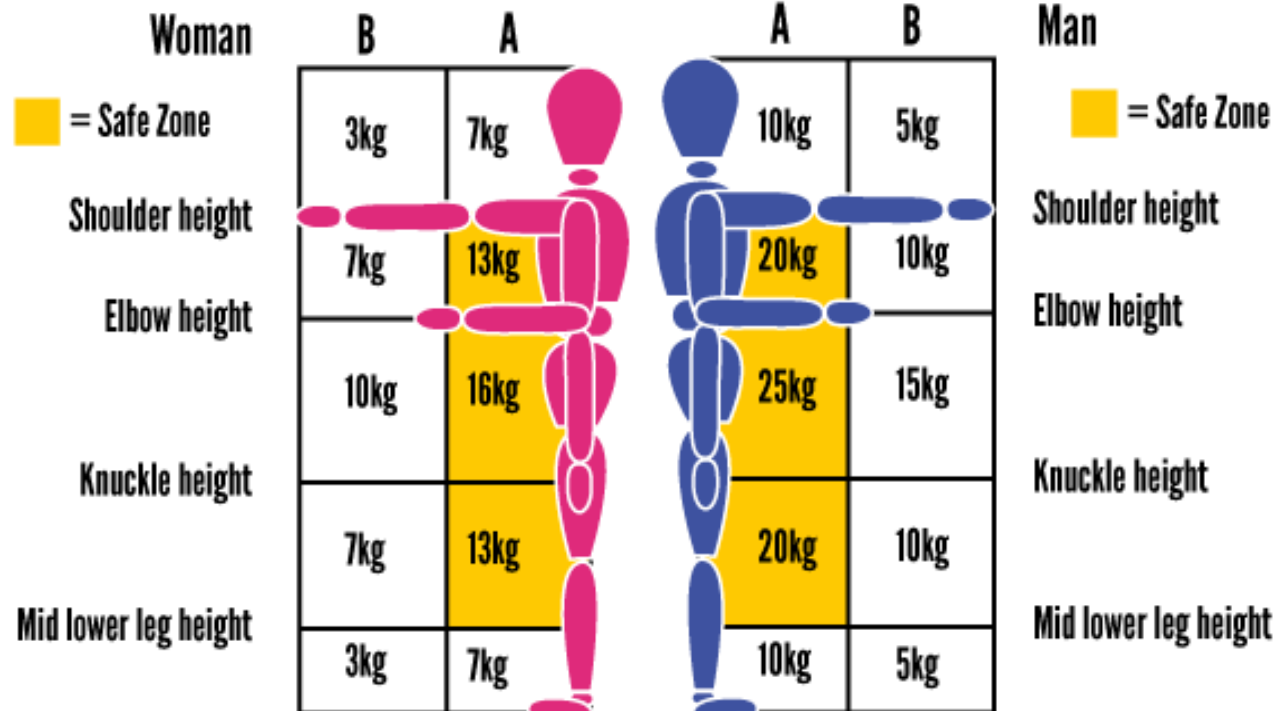
Good lumbar support

Īpašs risks, pārvietojot smagumus



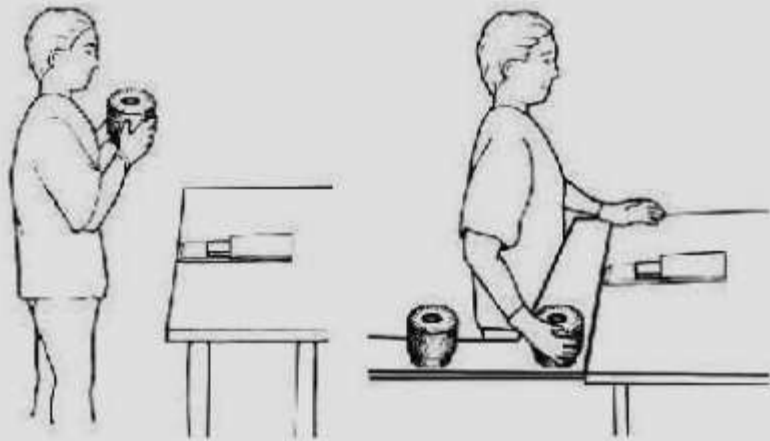
- ✓ neērta (pārāk liela, smaga, grūti satverama, nestabila, saturs var pārvietoties, slidenām virsma (eļļas, smērvielas u.c.)) krava
- ✓ jātur izstieptās rokās
- ✓ jāpārvieto saliecoties vai pagriežoties
- ✓ nepiemēroti pārvietošanas attālumi un virsmas (vertikāli, horizontāli)
- ✓ nepiemērots darba temps (ātrs, nemaināms)
- ✓ nepiemēroti individuālie aizsardzības līdzekļi, apģērbs un apavi
- ✓ neapmācīts darbinieks

Pareiza smagumu pārvietošana

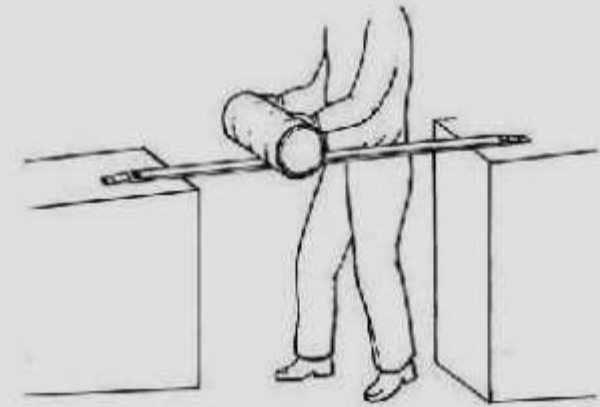


Avots: <https://www.gonzaga.edu/Campus-resources/offices-and-services-A-Z/Human-Resources/Environmental-Health-And-Safety/Ergonomics/Safe-Lifting-Techniques.asp>

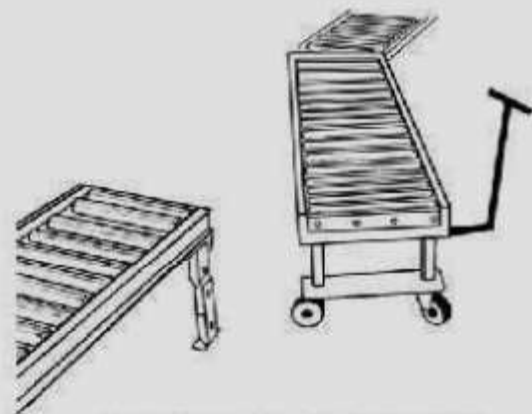
Avots: <http://www.dontpanicyouareonlymoving.com/the-diy-mover/safe-lifting-tips>



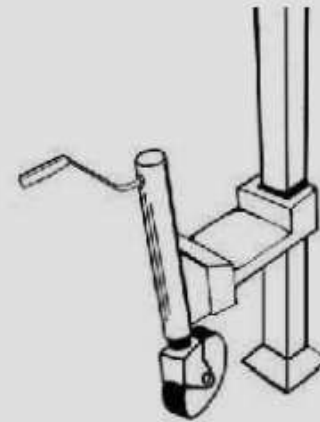
Slide surfaces — Low cost and effective



Slides can be configured at low cost in spots where standard conveyors do not fit.



Hinged gate and handle

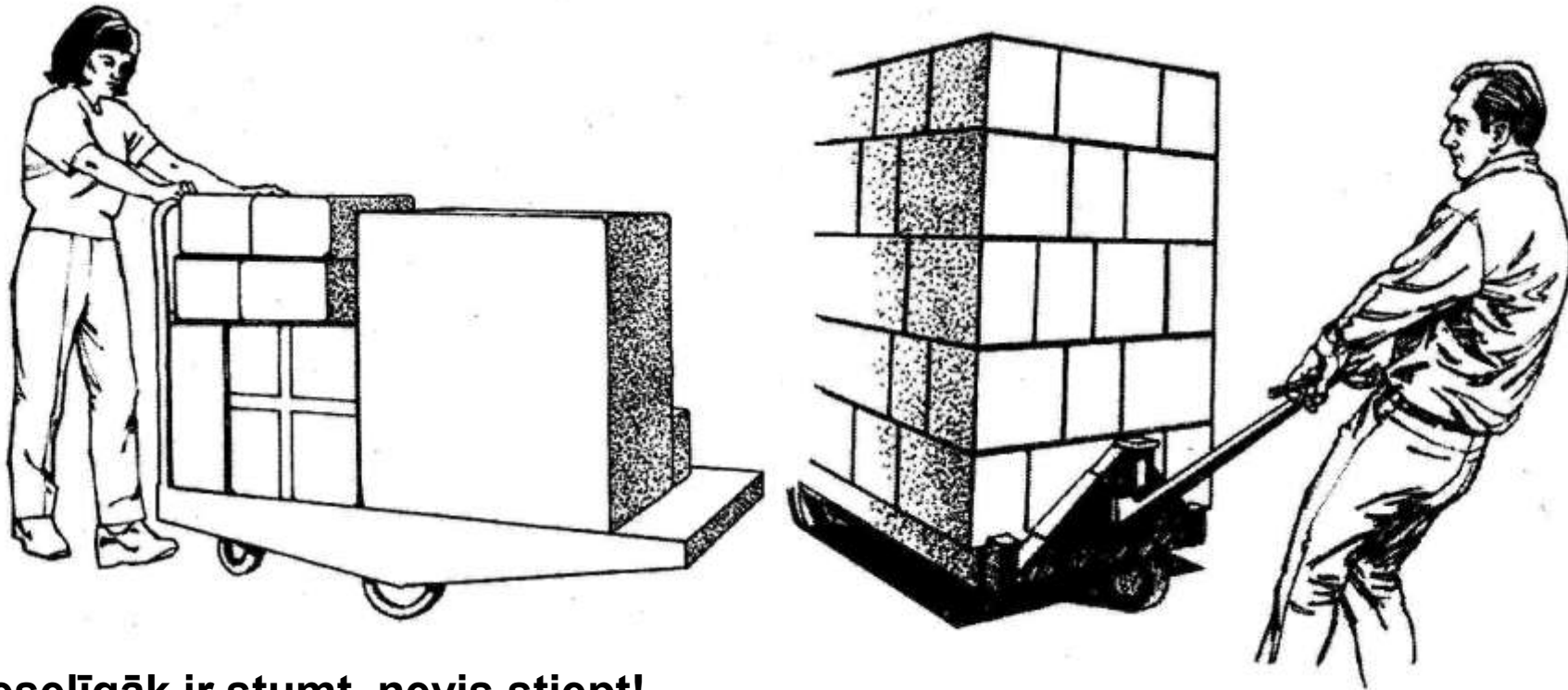


Detachable wheel

Smagumu pārvietošana

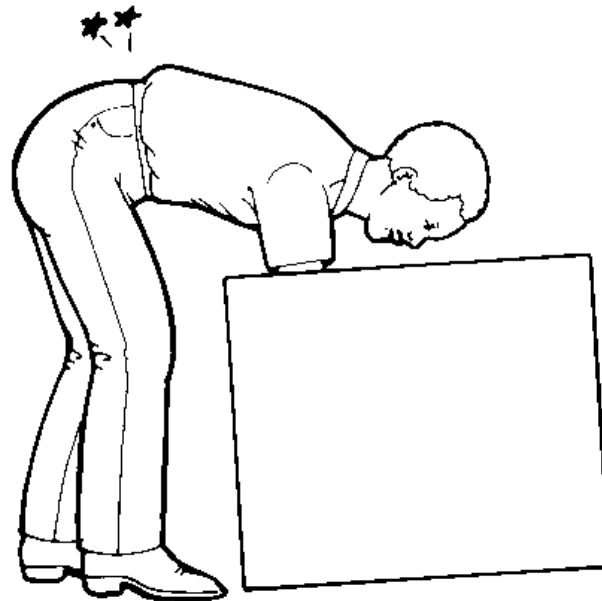
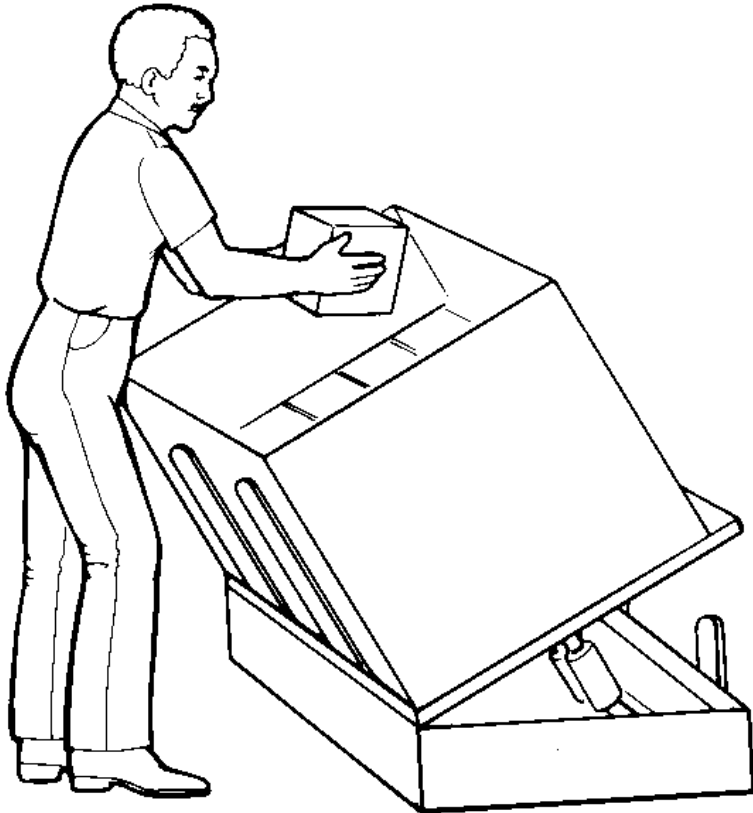


Smagumu pārvietošana

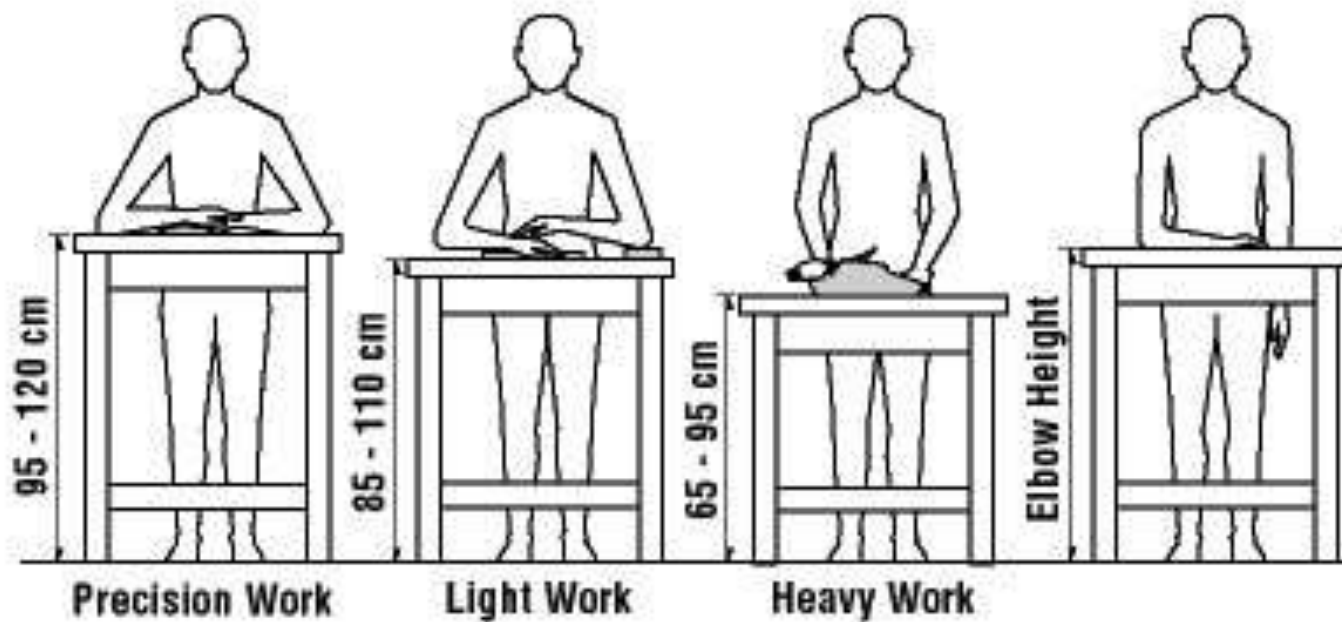


Veselīgāk ir stumt, nevis stiept!

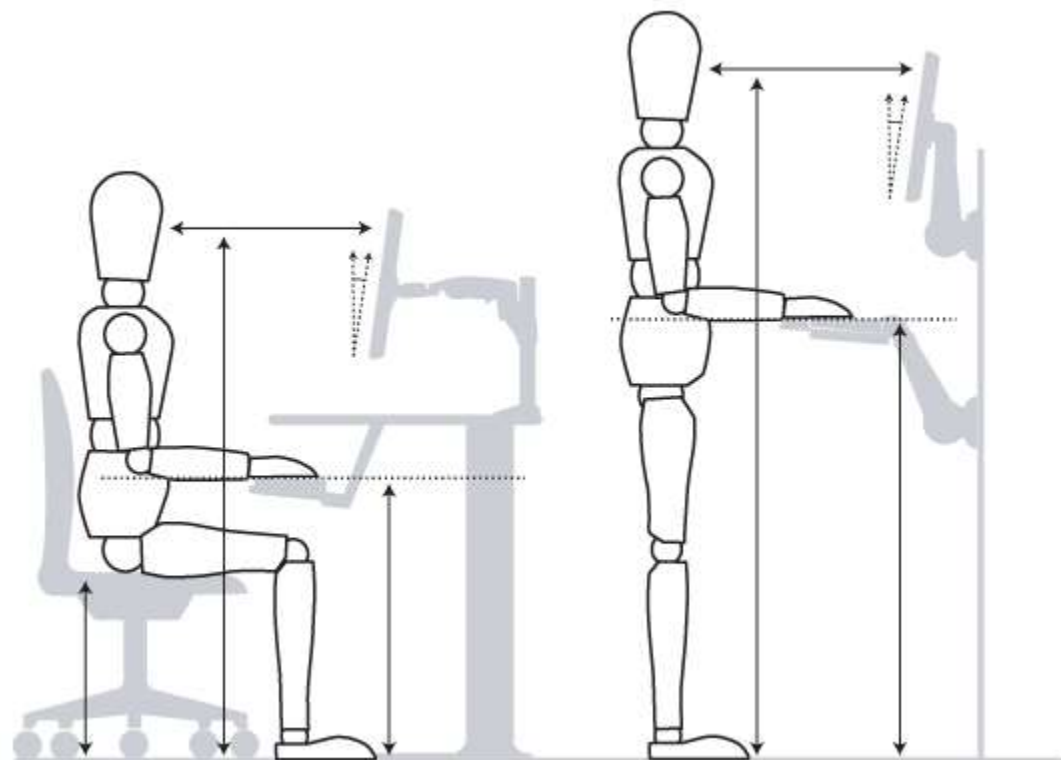
Atkārtota noliekšanās



Darba virsmas augstums



<https://s-media-cache-ak0.pinnimg.com/564x/ff/15/de/ff15de6501b71ab55463c0ee02391732.jpg>



Nogurdinošs darbs stāvus - risinājumi

Ērti apavi



Kompresijas zeķes



Speciālie amortizējošie paklāji



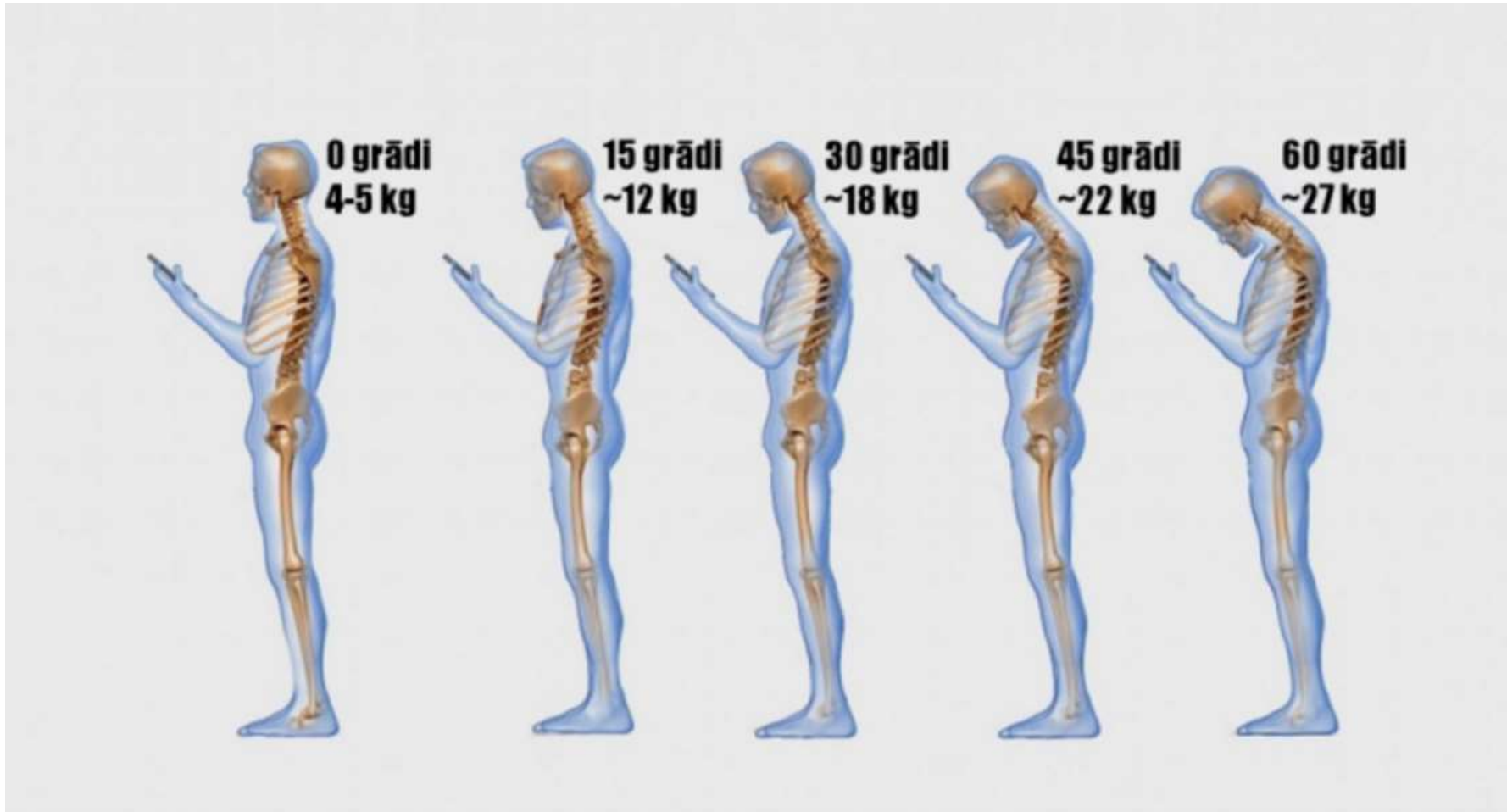
Ortopēdiskas zolītes



**Atpūtas paužu laikā apsēsties,
pacelt kājas augšā.**



Galvas noliekšana, skatoties mobilajā ierīcē



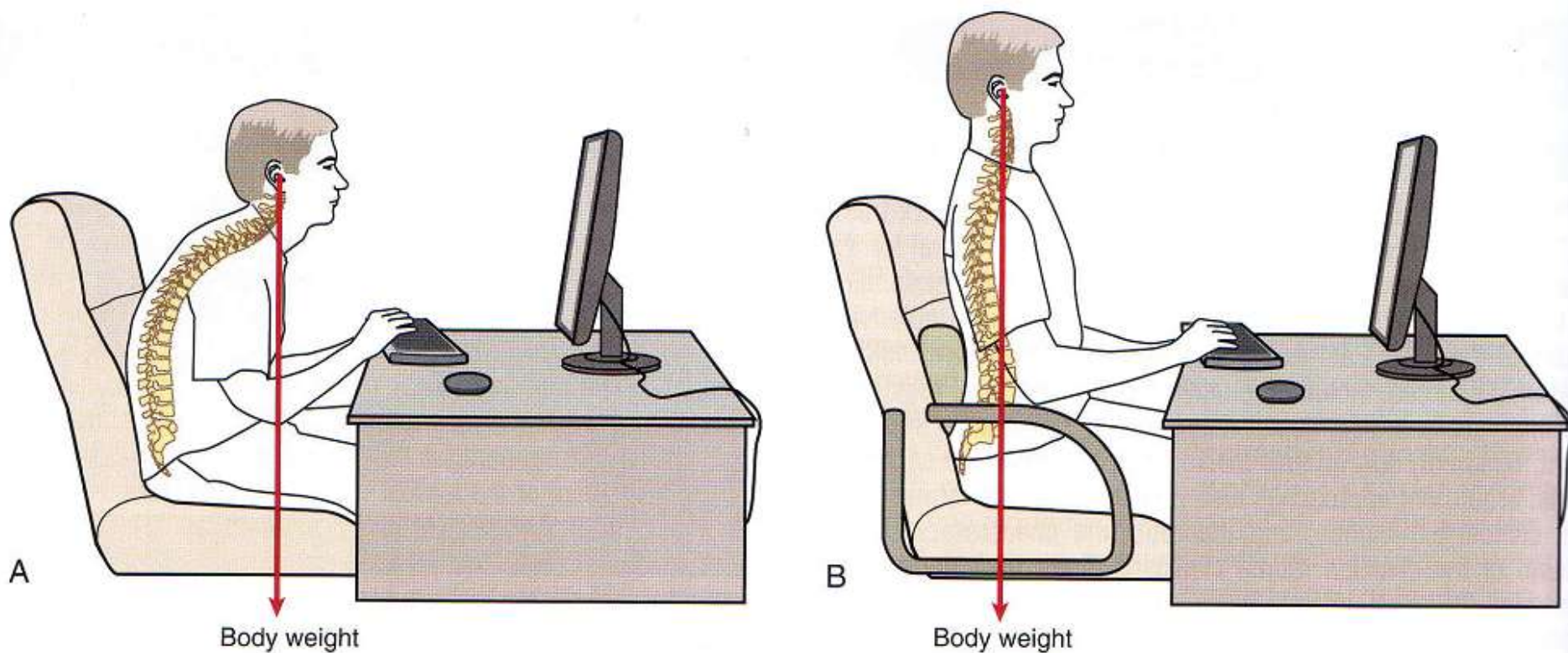
Darbs ar portatīvo datoru



- * Ilgstoši lietojot klēpdatoru, tas jāpaceļ un jāizmanto atsevišķa klaviatūra un datorpele



Darbs ar stacionāru datoru



Neumann D.A. "Kinesiology of the Musculoskeletal System – Foundation for Rehabilitation", 2nd ed., 2010

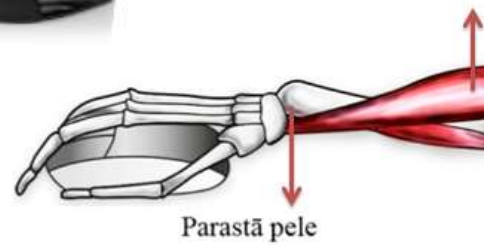
Risinājumi displeju novietošanai



* Svarīgākās funkcijas ir
atbilstoša attāluma un skata
leņķa nodrošināšana



Datora aksesuāri



Statiskā slodze - spēkpāris rada vērpes momentu



Fizioloģisks plaukstu stāvoklis

Ergonomisko risinājumu piemēri



Ergonomiski krēsli

- * Kvalitatīviem krēsliem ir iespējamās vismaz **17 dažādas pielāgojamas funkcijas**



Autovadītāja sēdēšanas ergonomika

NEPAREIZI PAREIZI



Figure 1



Figure 2



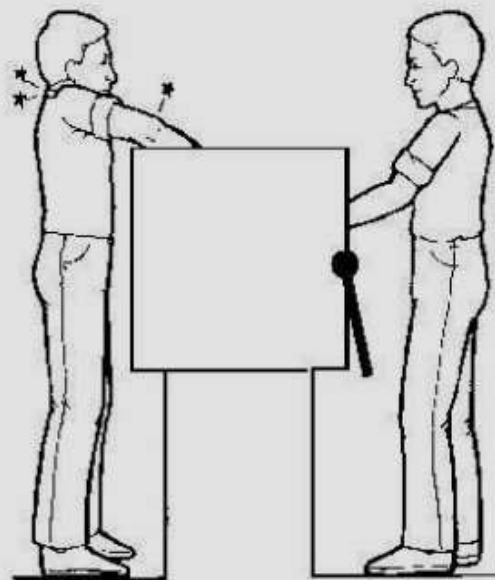
Veicot darba vietas
uzlabošanu, domājiet
radoši!!!

Ergonomika ne vienmēr
ir dārga.





Bent neck (and wrists) improved by tilting the machine.



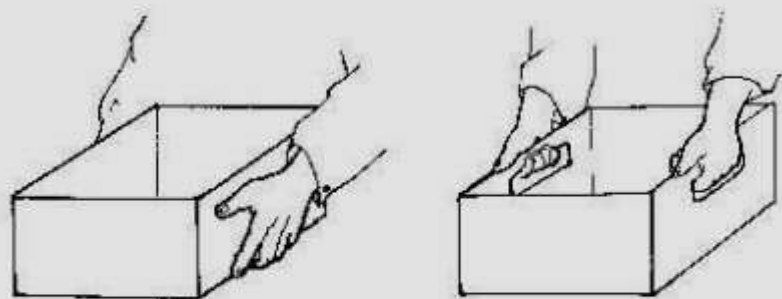
Container with drop down side



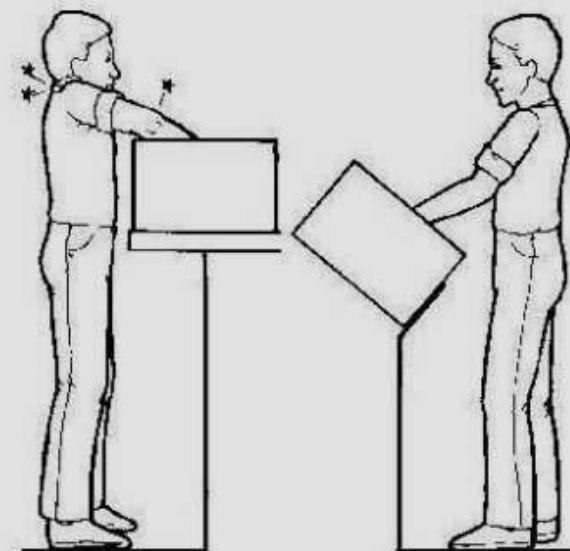
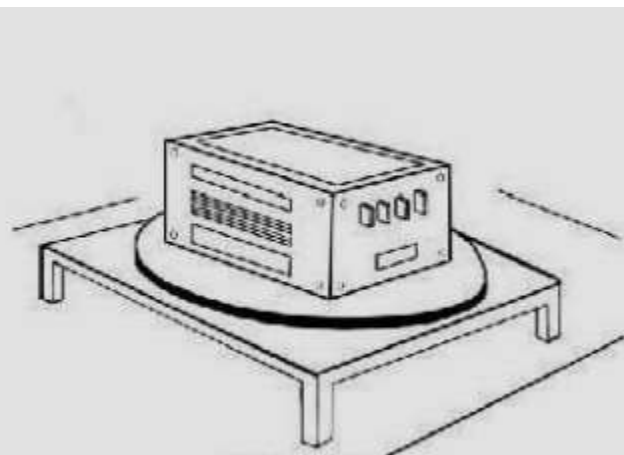
More motions



Fewer motions



Handholds enable use of a power grip, which reduces effort.

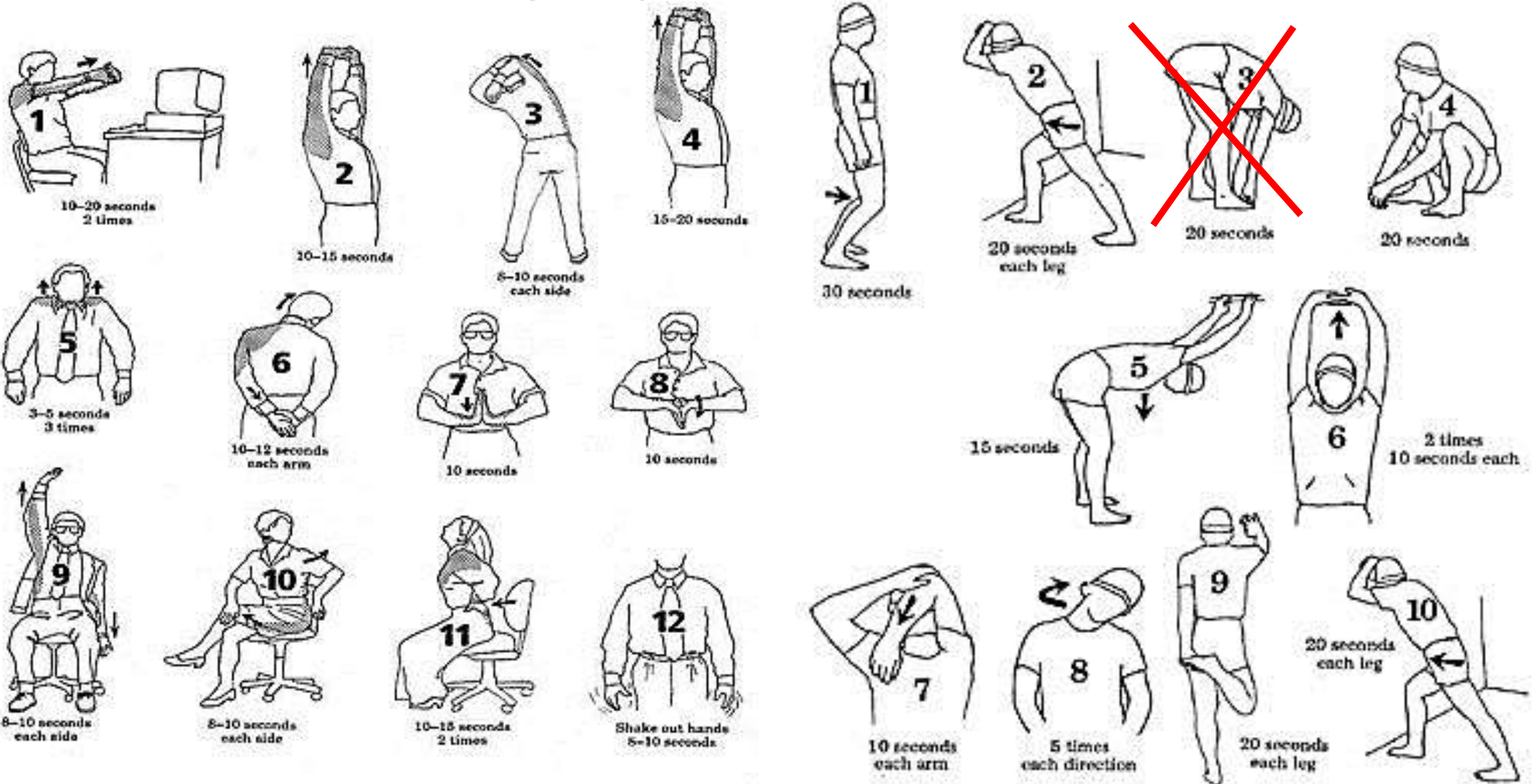


Tilting container stands is one of the most common, low-cost ways of reducing reaches.

- Veicot darba vietu ergonomikas novērtējumu un uzlabošanu, noteikti jāatceras par to, ka katram darbiniekam ir sava individualitāte, kura spēj piešķirt veicamajam darbam individuālas īpatnības (citreiz arī ļoti negaidītas)!!!
- Sekojiet darbinieku uzvedībai, pildot darba uzdevumu.



Stiepšanās vingrinājumi darbā

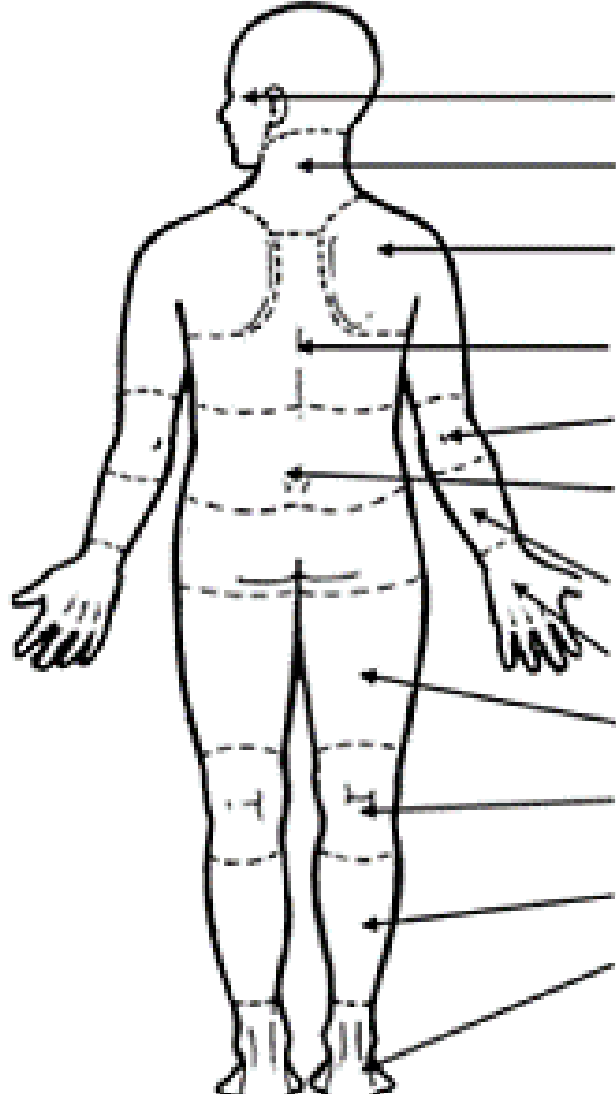


Darba vietas ergonomikas novērtēšanas paņēmieni

- Darbinieku aptauja par diskomfortu un sāpēm darba laikā/pēc darba
- Filmēšana/fotogrāfiju uzņemšana un analīze
- Speciālas novērtēšanas programmas (piem., *RULA (Rapid Upper Limb Assessment)*, *Strain Index*, *REBA (Rapid Entire Body Assessment)*, *TAPDA*, *NIOSH The Work Practices Guide for Manual Lifting*).
- Ergonomikas novērtēšana, pielietojot speciālu aparatūru



Darbinieku aptauja



Extremely Comfortable → Extremely Uncomfortable

Eye	1	2	3	4	5
Neck	1	2	3	4	5
Shoulder	1	2	3	4	5
UpperBack	1	2	3	4	5
Elbow	1	2	3	4	5
LowerBack	1	2	3	4	5
Arm	1	2	3	4	5
Wrist/Hand	1	2	3	4	5
Thigh	1	2	3	4	5
Knee	1	2	3	4	5
Calf of leg	1	2	3	4	5
Feet/Ankle	1	2	3	4	5

A. Arm and Wrist Analysis

Step 1: Locate Upper Arm Position:

Step 1a: Adjust...
 If shoulder is raised: +1
 If upper arm is abducted: +1
 If arm is supported or person is leaning: -1

Step 2: Locate Lower Arm Position:

Step 2a: Adjust...
 If either arm is working across midline or out to side of body: Add +1

Step 3: Locate Wrist Position:

Step 3a: Adjust...
 If wrist is bent from midline: Add +1

Step 4: Wrist Twist:
 If wrist is twisted in mid-range: +1
 If wrist is at or near end of range: +2

Step 5: Look-up Posture Score in Table A:
 Using values from steps 1-4 above, locate score in Table A.

Step 6: Add Muscle Use Score
 If posture mainly static (i.e. held > 10 minutes), Or if action repeated occurs 4X per minute: +1

Step 7: Add Force/Load Score
 If load < 4.4 lbs (intermittent): +0
 If load 4.4 to 22 lbs (intermittent): +1
 If load 4.4 to 22 lbs (static or repeated): +2
 If more than 22 lbs or repeated or shocks: +3

Step 8: Find Row in Table C
 Add values from steps 5-7 to obtain Wrist and Arm Score. Find row in Table C.

SCORES

Table A: Wrist Posture Score

Upper Arm	Lower Arm	Wrist Posture						
		1	2	3	4			
1	1	1	2	2	2	3	3	3
	2	2	2	2	2	3	3	3
	3	2	3	3	3	3	4	4
2	1	2	3	3	3	3	4	4
	2	3	3	3	3	3	4	4
	3	3	4	4	4	4	5	5
3	1	3	3	4	4	4	4	5
	2	3	4	4	4	4	5	5
	3	4	4	4	4	4	5	5
4	1	4	4	4	4	4	5	5
	2	4	4	4	4	4	5	5
	3	4	4	4	5	5	6	6
5	1	5	5	5	5	5	6	7
	2	5	6	6	6	6	7	7
	3	6	6	6	7	7	7	8
6	1	7	7	7	7	7	8	9
	2	8	8	8	8	8	9	9
	3	9	9	9	9	9	9	9

Table B: Trunk Posture Score

Neck Posture Score	Trunk Posture Score						
	1		2		3		
1	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2
2	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2
3	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2
4	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2
5	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2
6	Legs	1	2	1	2	1	2
	Legs	1	2	1	2	1	2

Table C: Neck, trunk and leg score

Wrist and Arm Score	Neck, trunk and leg score						
	1	2	3	4	5	6	7+
1	1	2	3	3	4	5	6
2	2	2	3	4	4	5	6
3	3	3	3	4	4	5	6
4	3	3	3	4	5	6	6
5	4	4	4	5	6	7	7
6	4	4	5	6	6	7	7
7	5	5	6	6	7	7	7
8+	5	5	6	7	7	7	7

Scoring: (final score from Table C)
 1 or 2 = acceptable posture
 3 or 4 = further investigation, change may be needed
 5 or 6 = further investigation, change soon
 7 = investigate and implement change

B. Neck, Trunk and Leg Analysis

Step 9: Locate Neck Position:

Step 9a: Adjust...
 If neck is twisted: +1
 If neck is side bending: +1

Step 10: Locate Trunk Position:

Step 10a: Adjust...
 If trunk is twisted: +1
 If trunk is side bending: +1

Step 11: Legs:
 If legs and feet are supported: +1
 If not: -2

Step 12: Look-up Posture Score in Table B:
 Using values from steps 9-11 above, locate score in Table B.

Step 13: Add Muscle Use Score
 If posture mainly static (i.e. held > 10 minutes), Or if action repeated occurs 4X per minute: +1

Step 14: Add Force/Load Score
 If load < 4.4 lbs (intermittent): +0
 If load 4.4 to 22 lbs (intermittent): +1
 If load 4.4 to 22 lbs (static or repeated): +2
 If more than 22 lbs or repeated or shocks: +3

Step 15: Find Column in Table C
 Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in Table C.

RULA – Rapid Upper Limb Assessment / Ātrā augšējās ekstremitātes novērtēšana

Task name: _____ Reviewer: _____ Date: ____/____/____ provided by Practical Ergonomics
 This tool is provided without warranty. The author has provided this tool as a simple means for applying the concepts provided in RULA. © 2004 Nease Consulting, Inc. rbarker@ergosmart.com (816) 444-1667

Sasprindzinājuma indekss

SI Strain Index

File Edit Help

Task Information		Strain Index	
Analyst	Job Name	Workstation ID	
Hand	Duration of Exertion	Efforts per Minute	Task Duration
<input checked="" type="radio"/> Right Side	Duration of all exertion (sec.): 30	Number of exertions: 20	Duration per Day (hour):
<input type="radio"/> Left Side	Total Observation time (sec.): 60	Total Observation time (min.): 11	8
Intensity of Exertion			
% Maximal Strength	Borg CR-10 Scale	Perceived Effort	
< 10%	< 2	Barely noticeable/relaxed effort	
10% - 29%	3	Noticeable/definite effort	
30% - 49%	4 - 5	Obvious effort; unchange facial expression	
50% - 79%	6 - 7	Substantial effort; changes facial expression	
> 80%	> 7	Uses shoulder or trunk to generate force	
Hand/Wrist Posture (degrees)			Speed of Work
Extension	Flexion	Ulnar Deviation	MTM -1
0 - 10	0 - 5	0 - 10	Perceived Posture
11 - 25	6 - 15	11 - 15	< 80% Extremely relaxed pace
26 - 40	16 - 30	16 - 20	81-90% Taking one's own time
41 - 55	31 - 50	21 - 25	91-100% Normal speed of motion
> 60	> 50	> 25	101-115% Rush, but able to keep up
			> 115% Rush, unable to keep up

<http://www.nexgenergo.com/ergonomics/ergointeluea.html>

Rapid Entire Body Assessment

File Edit Help

Task Information | **REBA Score**

Analyst: Job Name: Workstation ID:

Hand

Right Side Left Side

Wrist

<-15 Neutral > 15 Side Bent or Twist

Neck

< -20 0 to 20 > 20

Neck is twisting or side bending

Upper Arms

<-20 -20 to 20 21 to 45 46 to 90 >+90

Shoulder is raised
Upper arm is abducted
Arm is supported

Leg

Stable Unstable 30 to 60 > 60

Lower Arms

0 to 60 60-100 > 100

Trunk

< -20 -20 to 0 Neutral 0 to 20 21 to 60 > 60

Trunk is twisting or side bending

Coupling/Grip

Good Fair
Poor Unacceptable

Force or Load

<5 kg

Shock/rapid build up of force

Muscle Use

Static, eg. held for longer than 1 min Repeated more than 4 times/min
Rapid large posture change or unstable base

REBA (Rapid Entire Body Assessment) /
Ātrā visa ķermeņa novērtēšana

<http://www.nexgenergo.com/ergonomics/ergointeluea.html>